Amendments to the Drawings

In accordance with 37 CFR § 1.121(d)(1), attached hereto are two annotated sheets depicting changes made to drawing Figures 1a, 1b, 3a, and 3b. The attached Figures 1a, 1b, 3a, and 3b have been amended to comply with 37 CFR § 1.84 (o) by adding the "PRIOR ART" legend.

Also attached hereto are two replacement sheets of drawings, incorporating the changes made to Figures 1a, 1b, 3a, and 3b, which replace the drawing sheets originally submitted with the application.

Remarks

Reconsideration and allowance of this application, as amended, are respectfully requested.

The written description portion of the specification, claims 1-13, the abstract of the disclosure, and the drawings have been amended. New claims 14 and 15 have been added. Claims 1-15 are now pending in the application. Claim 1 is independent. The objections and rejections are respectfully submitted to be obviated in view of the amendments and remarks presented herein. No new matter has been introduced through the foregoing amendments.

The specification has been editorially amended for conformance with 37 CFR § 1.77(c), for consistency, and to correct any informalities. The abstract has been editorially amended for conformance with 37 CFR § 1.72(b). The drawing figures have been amended as described above in the "Amendments to the Drawings" section. The claims have been amended to overcome each ground of objection and rejection, and in general to more fully comply with U.S. practice. In view of the aforementioned claim amendments, new dependent claims 14 and 15 have been added to define features of the invention previously presented in the claims. Entry of each of the amendments is respectfully requested.

35 U.S.C. § 103(a) – Disclosed Art and Hirota '965

Claims 1-4 and 6-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over "the Applicant's Admission of Prior Art" in view of U.S. Patent No. 3,664,965 to Hirota et al. (hereinafter "Hirota '965").

The rejection of claims 1-4 and 6-8 under § 103(a) based on disclosed art and Hirota '965 is respectfully traversed. For at least the following reasons, the combined disclosures of the disclosed art and Hirota '965 would not have rendered obvious Applicants' claimed invention.

The combined disclosures of the disclosed art and Hirota '965 do not teach all of Applicants' claim features. Furthermore, there is simply no teaching in the disclosed art and Hirota '965 that would have led one to select the references and combine them, let alone in a way that would produce the invention defined by Applicants' claim 1.

Hirota '965 discloses a method for the detection of leaks in hull structures of ships or in tank structures or in other closed vessels, wherein a leakage detecting agent is applied to the areas of the structure to be inspected for leakage, whereupon pressurized gas is introduced to the void interior of the structure and bubbles emerging from the coated film identify defective points. Hirota '965 merely teaches a particular chemical composition for the testing liquid.

However, leakage testing based on the introduction of pressurized gas is restricted to essentially hollow structures, such as the hull structures mentioned in Hirota '965. In the present application, on the other hand, the components to be tested, i.e., honeycomb or sandwich-type composite materials, are essentially solid, but contain a number of cavities or chambers. Since the plurality of cavities in such a composite body are located isolated from each other within the component and are thus inaccessible from the outside, it is technically impossible to provide them with pressurized gas without damaging the structure. The gas-pressure testing context of Hirota '965, therefore, is not feasible for testing of the structures associated with the present invention.

Moreover, it is doubtful that the gas pressure level inside a large hollow structure, e.g., a tank, could be sufficiently raised by providing heat through an irradiation device, since a huge volume of gas is required to be heated and there is a need to compensate for energy losses. At least it would be preferable for large hollow bodies to achieve an increase in the pressure level of the enclosed gas by introducing pressurized gas. It hence would not have been obvious for a person skilled in the art developing gas pressure testing devices for large hull structures, at least where the interior is accessible, to consider heating the gas in order to raise the gas pressure level, since

this would - if even feasible at all - involve a cumbersome and time-consuming procedure for large voids.

As pointed out above, however, there is a large variety of components having isolated cavities within the component that cannot be provided with pressurized gas directly, so that the gas pressure testing fails. The present invention provides a fast and reliable leakage test for the above-mentioned class of materials, which overcomes the limitations and disadvantages of the methods described in the prior art.

Furthermore, the disclosed art is not logically combined with Hirota '965. For example, CA 2 148 844 A ("CA '844") teaches a method for leaking-testing air barriers in buildings in which a suction bell is put over the area to be tested and a fan produces a negative pressure which causes bubbles to emerge from the film consisting of foaming material that has been applied to the surface. Hence, CA '844 is analogous to Hirota '965, the main difference being that vacuum is used instead of pressurized gas. CA '844 doesn't disclose heating the material to be tested in order to cause an expansion of gas enclosed in cavities.

Providing such a temperature increase is only shown for prior art methods, where the material to be tested is immersed in a liquid-filled basin. Herein it is known to heat the liquid, whereupon the expanded air enclosed in cavities escapes at potential leaks, forming bubbles which are used to localize the leaks. According to the present invention, however, the liquid is

applied on the area to be tested, which is certainly not analogous to the liquid basins shown in the prior art. On the contrary, it is an object of the present invention to provide a method that does without liquid basins, since methods involving the immersion of a component in a liquid basin demand complex handling, in particular with large components. The prior art methods do not allow for rapid and reliable identification of the flaws, and are much more time and energy consuming as compared to Applicants' claimed method. There may also be composite materials that are not to be immersed in a liquid basin because water and humidity entering the cavities through leaks may cause damage to the structures.

Besides the above-described differences between the disclosed art and the present invention, a person skilled in the art would certainly not consider using a foam-forming liquid for the liquid basins deployed in the prior art methods described above, since this would hamper the detection of flaws due to the uncontrolled formation of bubbles in a basin filled with foam-forming liquid.

Accordingly, the combined disclosures of the disclosed art and Hirota '965 would not have rendered obvious the invention defined by any of Applicants' claims 1-4 and 6-8.

35 U.S.C. § 103(a) – Hirota '965

Claims 1, 4, 6, and 8-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hirota '965.

For the reasons identified above with respect to Hirota '965, the rejection of claims 1, 4, 6, and 8-10 under § 103(a) based on Hirota '965 is also respectfully traversed.

The disclosure of Hirota '965 does not teach all of Applicants' claim features. Furthermore, there is simply no teaching in Hirota '965 that would have led one to modify the reference in a way that would produce the invention defined by Applicants' claim 1. Claims 4, 6, and 8-10 are allowable because they depend, either directly or indirectly, from claim 1, and for other reasons.

35 U.S.C. § 103(a)

Since Hirota '965 is the primary reference in each of the other rejections under § 103(a) -- claim 5 as being unpatentable over Hirota '965 in view of U.S. Patent No. 4,553,453 to Goldfarb et al. ("Goldfarb"), and claims 11-13 as being unpatentable over Hirota '965 in view of U.S. Patent No. 4,113,673 to Hirota et al. ("Hirota '673") -- each of these rejections is also respectfully traversed. The combined disclosures of the cited references would not have rendered obvious Applicants' claimed invention because the disclosures of Goldfarb and Hirota '673 do not rectify any of the above-described deficiencies of Hirota '965.

For example, Goldfarb teaches a method of detecting leaks in glass-to-metals seals 13 of microelectronic devices 11 that may leak under heat-induced stress. An infrared source 31 provides controlled radiant heating of the device 11 and a leak detector 19 detects the helium leakage through microcracks in the glass-to-metal seals 13. Applicants' claimed feature of applying a foam-forming testing liquid to detect the formation of bubbles is simply not disclosed.

Hirota '673 also does not rectify the deficiencies of Hirota '965. Hirota '673 describes a coating composition for leak detection in an air test which consists of filling compressed air into the hull of a watertight or airtight structure to be tested, providing a coat of a foamable composition onto the surface so that a foam is produced, and identifying leaks through emerging bubbles. But that is not Applicants' claimed method.

Furthermore, there is simply no teaching in any of the references that would have led one to select the references and combine them in a way that would produce the invention defined by any of Applicants' pending claims.

Therefore, the various combinations of references would not have rendered obvious the invention defined by Applicants' pending claims 5 and 11-13.

In view of the foregoing, this application is now in condition for allowance. If the examiner believes that an

interview might expedite prosecution, the examiner is invited to contact the undersigned.

Respectfully submitted,

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Annotated Sheet

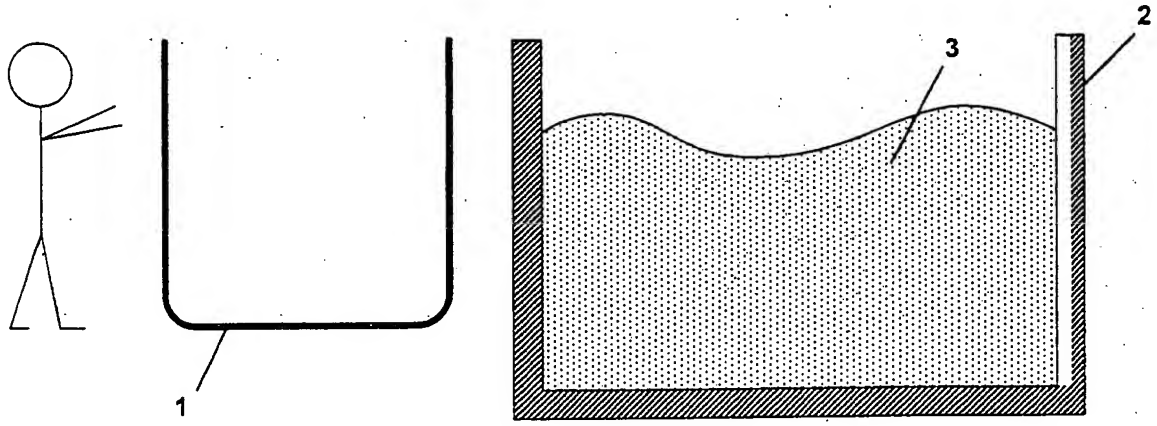

Fig. 1a PRIOR ART

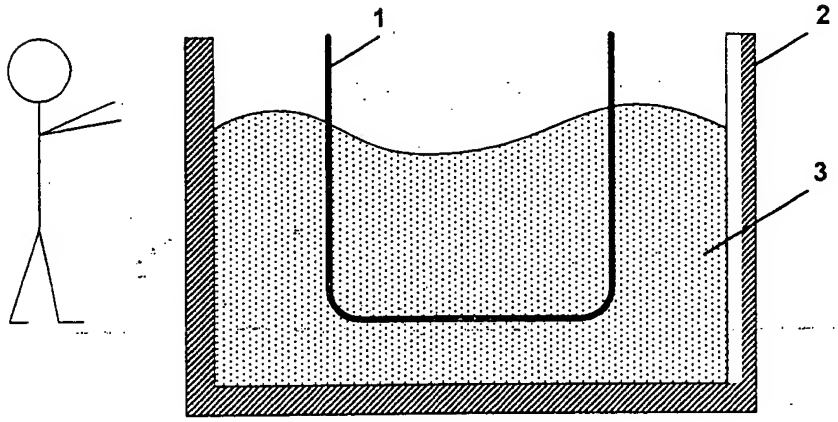

Fig. 1b PRIOR ART

Annotated Sheet

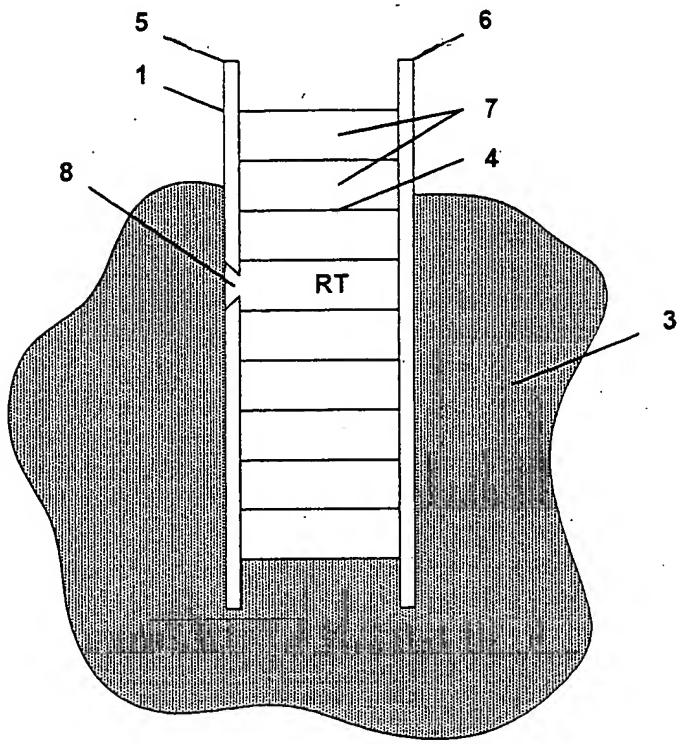

Fig. 3a PRIOR ART

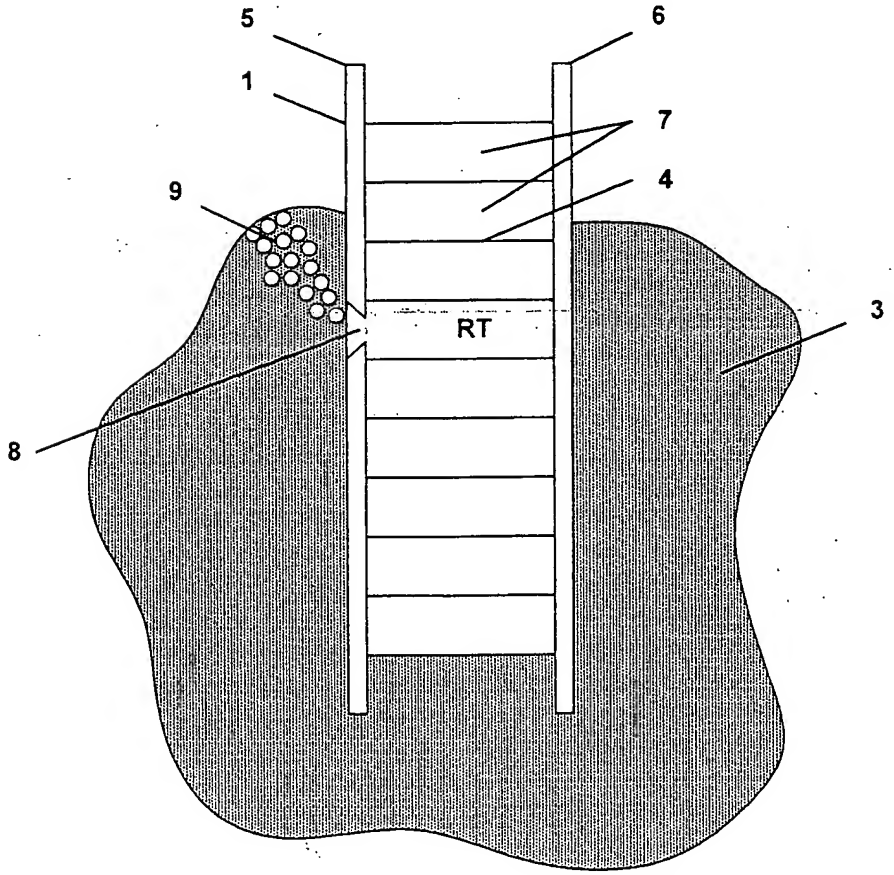

Fig. 3b PRIOR ART